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ABSTRACT

In response to a request by the Committee on Science and Technology, United States House of Representatives, this report analyzes how scientific research is funded at research universities in the United States, with a particular focus on how federal funding for research fits into the total finances of these institutions. Major sections of the document deal with: (1) operating revenues and expenditures; (2) revenues for research and development in science and engineering; (3) indirect costs for research and development; (4) costs relating to university physical plants; (5) research capabilities under alternative levels of federal funding; and (6) objectives, scope, and methodology of the study. It was determined that although federal research support has increased, it did so at a much slower rate than most other research revenue sources. Industrial support for research has more than doubled since 1975, but still represents less than 6 percent of research and development revenues. In addition, it was found that university revenues and expenditures have increased faster than the rate of inflation over the past 10 years, increased tuition represented the fastest growing component of the educational and general revenue category, and federal support to universities decreased in general and physical plant revenues. (TW)

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United States General Accounting Office

GAO

Briefing Report to the Chairman,
Committee on Science and Technology
House of Representatives

July 1986

ED275554

UNIVERSITY FINANCES

Research Revenues and Expenditures

U.S. DEPARTMENT OF EDUCATION
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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION

July 11, 1986

B-221714

The Honorable Don Fuqua
Chairman, Committee on Science
and Technology
House of Representatives

Dear Mr. Chairman:

Your letter of November 2, 1984, requested that we provide a comprehensive analysis of how scientific research is funded at U.S. research universities. You asked us to focus particularly on how federal funding for research fits into the total finances of research universities.

Specifically, you requested that for a sample of research universities we (1) analyze total revenues and expenditures, (2) examine how the institutions support research, paying particular attention to the sources of their research revenues, and (3) discuss universities' capacity to accommodate a continued or changing level of federal research funding. We subsequently agreed with your staff that we would obtain data from the sample institutions and reconcile them to the extent possible with published statements or reports from the institutions (annual reports or other documents that have been audited by federal, state, or private auditors) but that we would not independently audit these figures.

We selected a random sample of 28 institutions from the 100 universities receiving 85 percent of federal funds in fiscal year 1983, the latest year for which such data were available. As we discuss in our section on methodology, we believe this sample generally reflects the situation of the major research universities. We collected data for fiscal year 1975 and fiscal years 1980-84. We also interviewed senior academic officials at our sampled institutions to get their perceptions of what would happen to research activities under different federal funding scenarios.

The following are selected findings from our sample of research universities. As noted in the report, some of these data are for less than 28 universities because many institutions were not able to provide complete data for all years.

Regarding research revenues and expenditures, we found that:

--Federal research support has increased, but at a slower rate than most other research revenue sources, resulting in a decline in the federal share of research revenues from 71 percent in 1975 to 66 percent in 1984. Industrial support for research has more than doubled in constant dollars but is still less than 6 percent of research and development revenues, on average. The remaining research revenues came from state appropriations, state and local government grants and contracts, federal appropriations, and other institutional funds (such as endowment and private gifts).

--Indirect costs as a percentage of each federal research dollar rose from 22 percent in 1975 to 26 percent in 1984. Public institutions' overall level of indirect costs remained at a relatively constant 20 percent. Private institutions' indirect costs rose from 24 percent in 1975 to 31 percent in 1984. (This steady increase in indirect costs has been the subject of much controversy. Recent changes by the Office of Management and Budget to Circular A-21 will cap the future amount of indirect cost reimbursement for certain administrative costs.)

Regarding universities' overall finances and physical plant, we learned that:

--University revenues and expenditures have increased faster than the rate of inflation over the past 10 years.

--Tuition and fees rose 60 percent for private universities and 37 percent for public universities (based on constant dollars). This was the fastest growing component of the educational and general revenue category.

--Federal support to universities (largely for research and development and financial aid) decreased as a portion of their educational and general revenues, from 26 percent to 22 percent for public universities and 36 percent to 32 percent for private universities.

--Revenues from federal and state sources decreased as proportions of total physical plant revenue over the period while revenues from private and other institutional sources rose.

--While physical plant debt increased for private universities, it decreased for public universities.

Regarding future university research capability we were told that:

--University officials consider inadequate research equipment and facilities to be the major impediments to research.

--University officials believe that if federal funds for research decline, personnel reallocation and retrenchment would occur, the infrastructure would be even more inadequate, and new endeavors could be cut. However, some institutions have identified specific fields, predominantly those that are interdisciplinary and involve applied research, which they would like to see emphasized on their campuses as part of their strategy to attract more non-federal research funding.

We did not request agency comments because our work was not carried out at any agencies and we do not have any adverse comments about any agencies or organizations. However, we requested comments on an earlier draft of this report from several government, university, and private experts on university finances and research. Their comments are incorporated in this report where appropriate.

We are sending copies of this report to the major federal agencies funding research at universities, to the universities who participated in this study, and to other interested parties upon request. If you have additional questions or if we can be of further assistance in this matter, please contact me at (202) 275-1000.

Sincerely yours,

Sarah P. Frazier

Sarah P. Frazier
Associate Director

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ABBREVIATIONS

E&G	educational and general
G&C	grants and contracts
GAO	General Accounting Office
IC	indirect cost
NSF	National Science Foundation
OMB	Office of Management and Budget
R&D	research and development
RCED	Resources, Community, and Economic Development Division
S/L	state and local

SECTION 1

INTRODUCTION

7

Table 1.1

Sample of 28 Universities by Institutional Control and by National Rank in Federal Research and Development Funds Received in FY 1983

Public universities	Rank
University of Wisconsin - Madison	7
University of Minnesota	10
University of California - Berkeley	15
University of California - San Francisco	16
University of Colorado	22
Purdue University	35
Ohio State University	36
University of Iowa	37
University of Utah	39
University of Florida	47
New Mexico State University	50
Colorado State University	60
University of Illinois - Chicago	62
Virginia Commonwealth University	67
University of Cincinnati	71
University of Kentucky	91
University of Maryland - Baltimore Professional School	95
University of Nebraska - Lincoln	96
Private universities	
Stanford University	3
Yale University	11
University of Pennsylvania	14
Washington University	23
University of Rochester	26
Northwestern University	41
Case Western Reserve University	45
Boston University	54
Brown University	73
Dartmouth College	97

The Chairman of the House Committee on Science and Technology asked us to examine how scientific research is funded at U.S. research universities,[1] particularly focusing on how federal funding for research fits into the total finances of these universities. This is the third and final report to look at university-based research issues.[2]

This study is based on data collected from 28 research universities, randomly drawn from the 100 universities that received the most federal research funds in fiscal year 1983 (table 1.1). The sample includes 18 public and 10 private institutions, and the data collected cover fiscal years 1975, and 1980 through 1984. In addition, we interviewed senior officials at our sample institutions to get their perceptions of what would happen under different federal funding scenarios.

Except where noted, dollars are reported as 1984 constant dollars (using gross national product implicit price deflators), and percentages are calculated from that base. For a description of the objectives, scope, and methodology used to collect these data, see section 7.

1In this report, "research" is used interchangeably with "research and development."

2University Funding: Federal Funding Mechanisms in Support of University Research (GAO/RCED-86-53, Feb. 13, 1986) and University Funding: Assessing Federal Funding Mechanisms for University Research (GAO/RCED-86-75, Feb. 7, 1986).

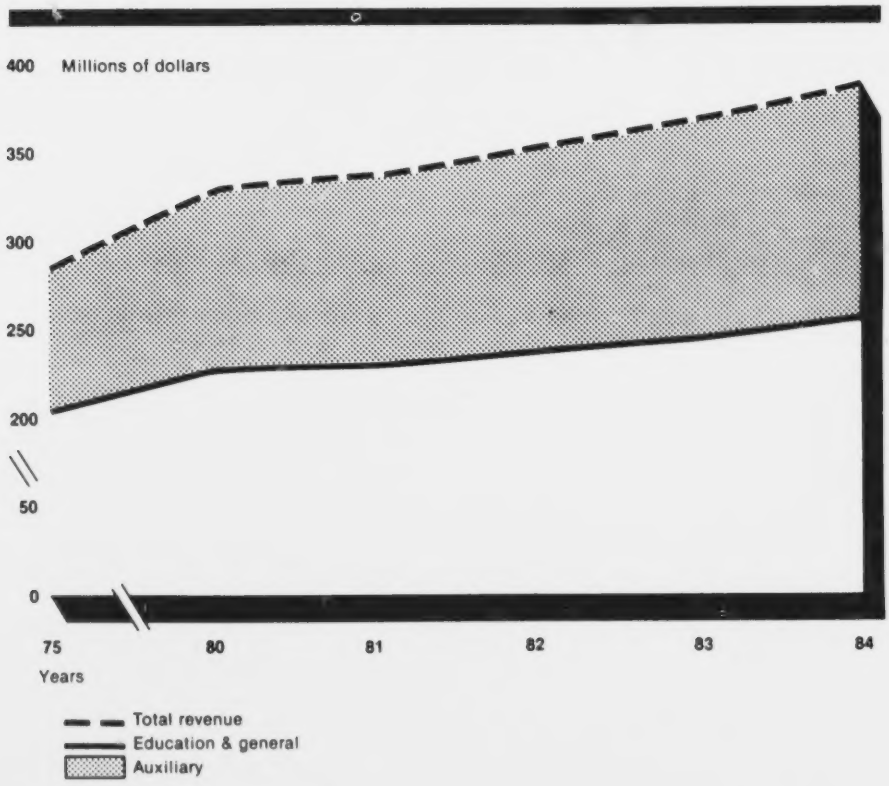
SECTION 2

OPERATING REVENUES AND EXPENDITURES

- Overall university operating revenues increased faster than the rate of inflation from 1975 to 1984.
- The fastest growing source of universities' educational and general revenues was tuition and fees, increasing 60 percent for private universities and 37 percent for public universities.
- Federal support to universities (largely for research and development and financial aid) decreased as a portion of their educational and general revenues, from 26 percent to 22 percent for public universities and 36 percent to 32 percent for private universities.
- Direct costs for instruction and research continue to be universities' largest expenditure, but universities spent proportionately more for operations and maintenance, administration, and other activities in 1984 than in 1975.

Figure 2.1

Overall University Operating Revenues
(1975, 1980-84)



18 Public and 10 Private Institutions

OVERALL UNIVERSITY OPERATING REVENUES

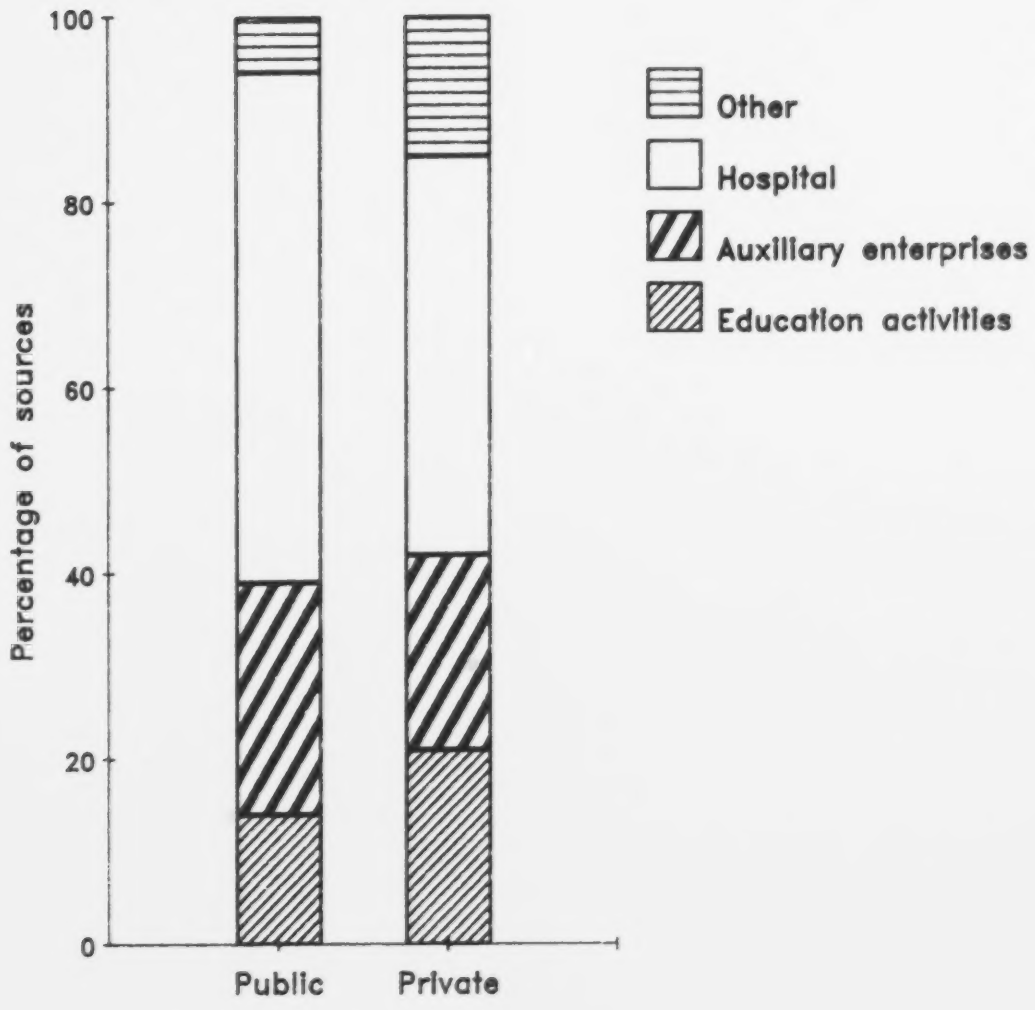
Overall university operating revenues increased faster than the rate of inflation. The research universities in our sample increased their revenues, on average, by 37 percent, from $284 million in 1975 to $389 million in 1984.

The fastest growing portion of revenues was "auxiliary and other sources," up, on average, by 66 percent. Income from this source increased from an average of $82 million in fiscal year 1975 to $136 million in fiscal year 1984. This category includes dormitories, hospitals, and sales and services from other educational activities.

By contrast, educational and general revenues (tuition and fees; government appropriations; government grants and contracts; private gifts, grants, and contracts; and endowment income) increased by 25 percent, from an average of $202 million per university in 1975 to $252 million in 1984.

Figure 2.2

Auxiliary and Other Sources of Revenue,
Public and Private Universities
(1984)



18 Public and 10 private institutions

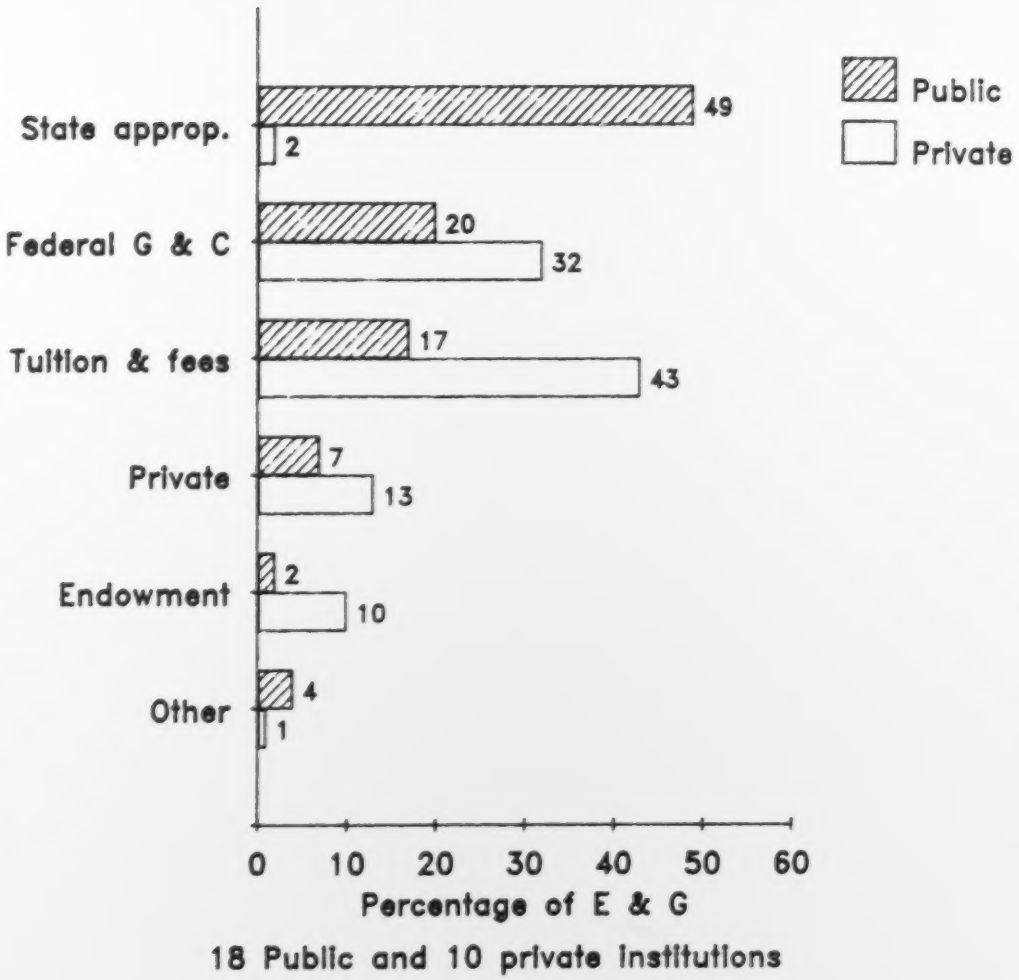
Auxiliary and other sources

The growth in "auxiliary and other sources" was driven by hospitals' gross revenues,[3] which make up about half of this category, for both public and private institutions. Hospital revenues increased 85 percent from 1975 to 1984, from an average of $37 million to $69 million annually. Auxiliary enterprises, such as dormitories, were the second largest source of revenue in this category for public universities. Auxiliary enterprises and sales and services of educational activities were almost tied as the second largest source of revenue for private universities.

[3]The 11 public institutions reporting hospital revenues for all years had hospital expenditures that more than offset these revenues (apparent losses) for most of these years. The four private institutions reporting hospital revenues showed lower hospital expenditures (apparent gains) for most of these years.

Figure 2.3

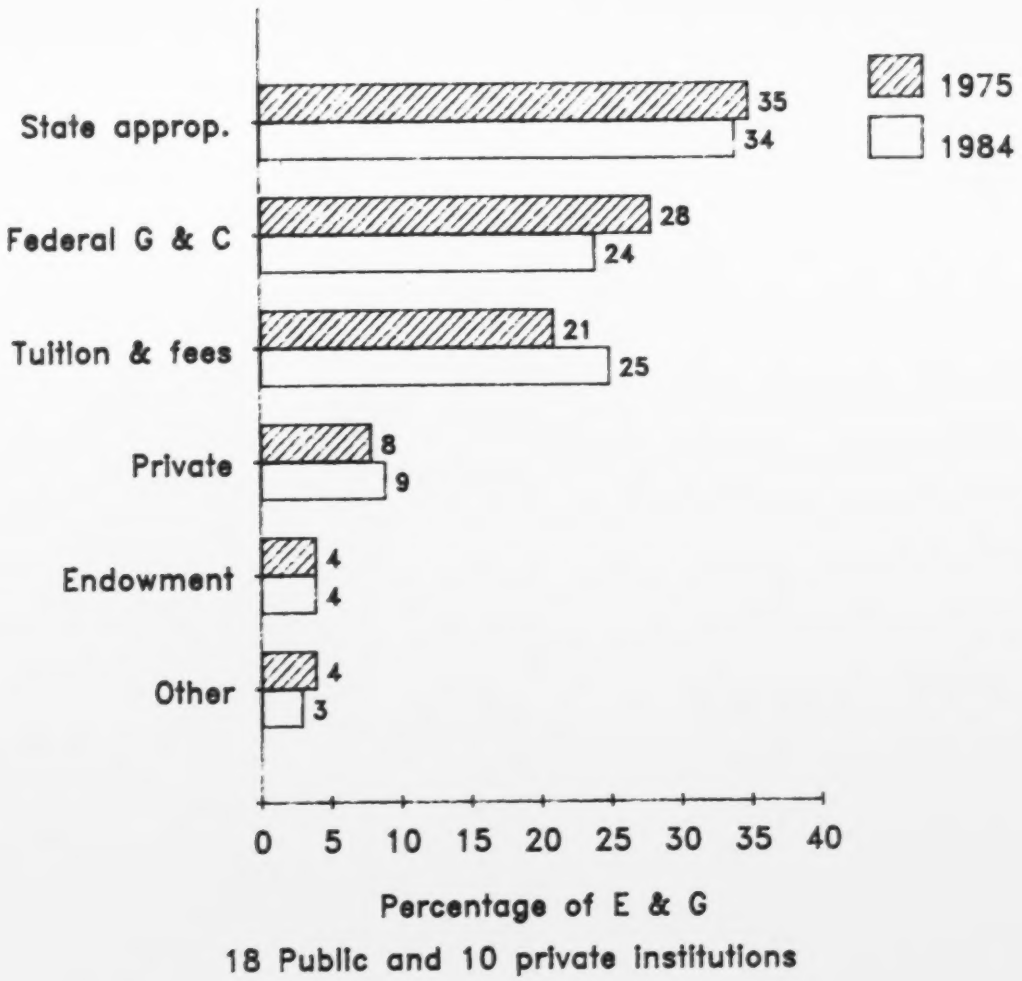
Sources of Educational and General Operating Revenues, Public and Private Universities[a] (1984)



[a]Percentages do not add to 100 because of rounding.

Figure 2.4

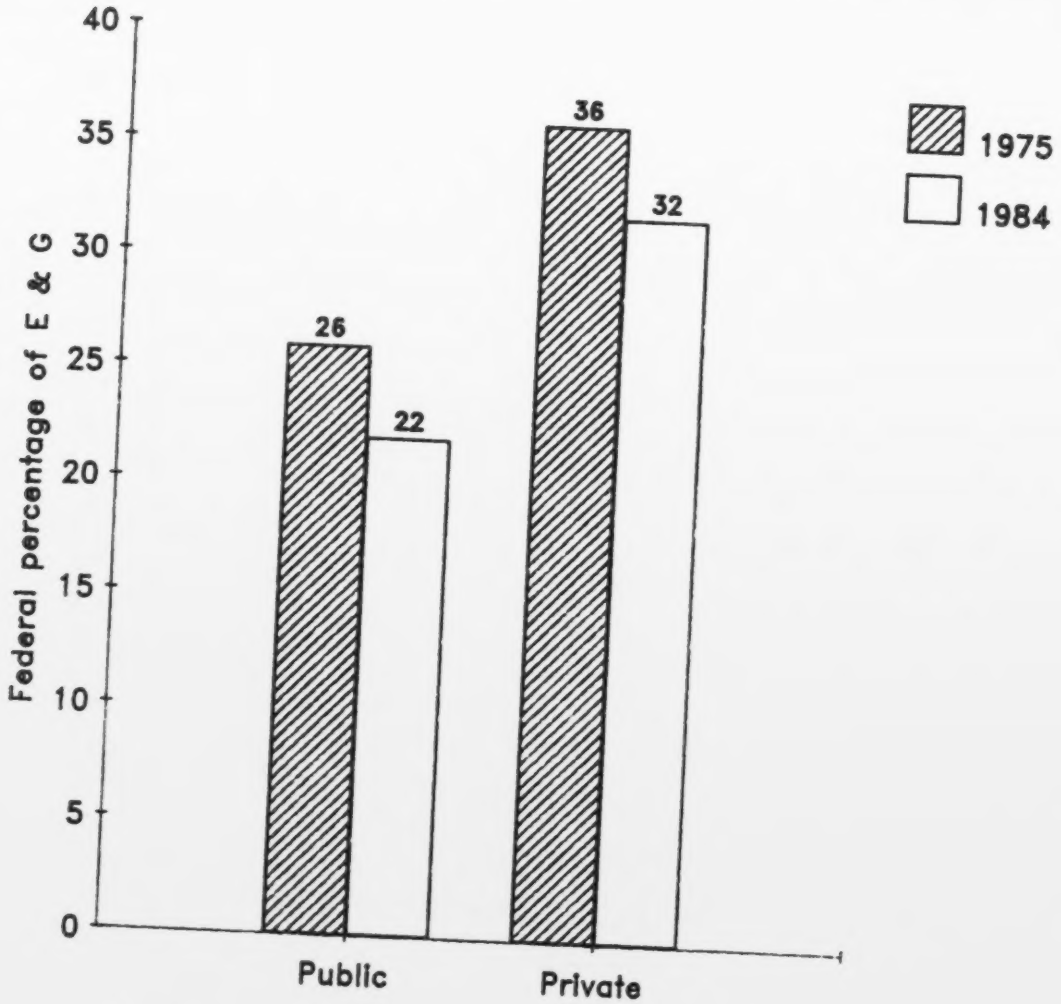
Educational and General Operating Revenues[a]
(1975, 1984)



[a]Percentages do not add to 100 because of rounding.

Figure 2.5

Federal Share of Educational and General Operating Revenues
(1975, 1984)



18 Public and 10 private institutions

Sources of educational and general operating revenues

Public universities depended on state governments for about one-half of their educational and general operating revenues in 1984. For private institutions, which receive little state appropriations, tuition and fees constituted 43 percent of revenues (fig. 2.3).

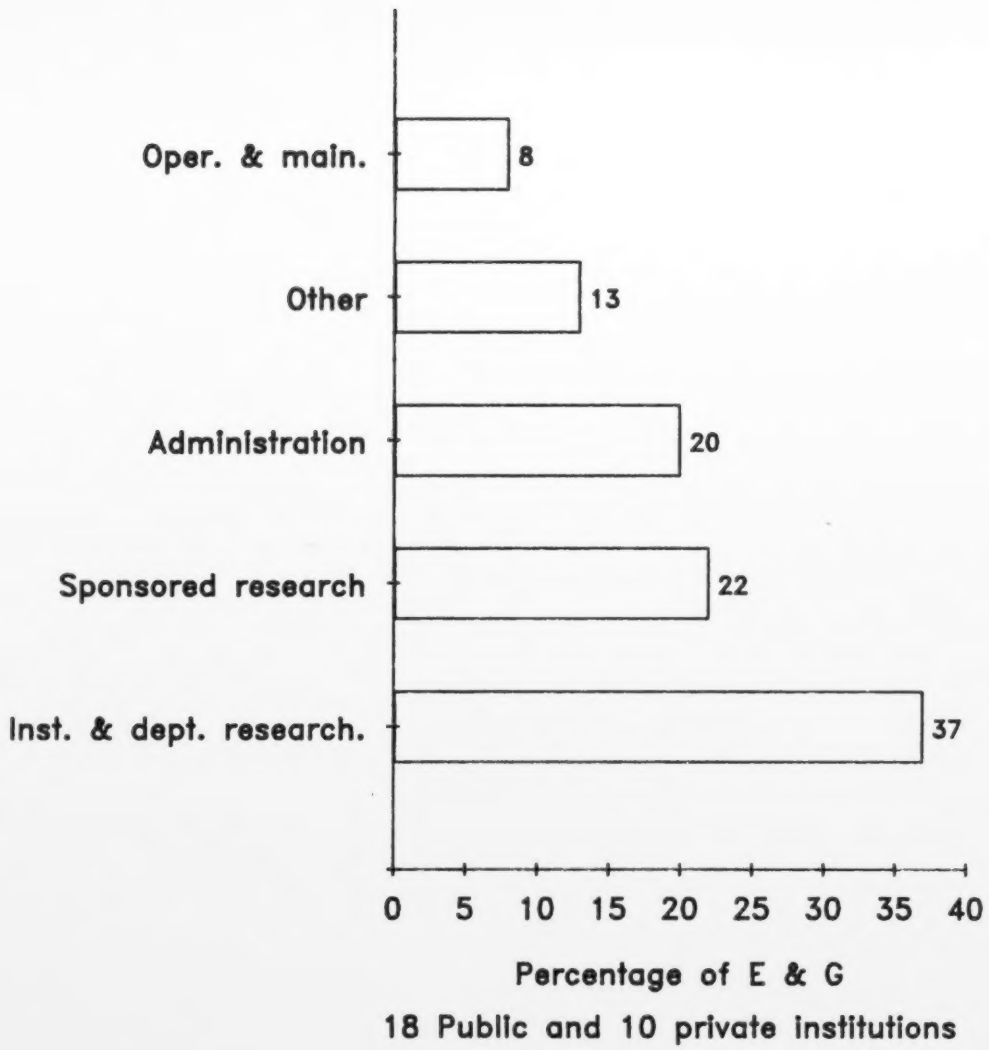
Tuition and fees was the fastest growing portion of educational and general operating revenues (fig. 2.4). Revenues from tuition and fees were 48 percent greater in 1984 than in 1975 for the overall sample. Tuition and fees of private institutions increased 60 percent while for public institutions they rose 37 percent.

In terms of federal support for all the universities in our sample, federal grants and contracts (including research and student aid) grew by 8 percent, a significantly lower rate than overall educational and general revenues (25 percent); the federal share was therefore smaller in 1984 than in 1975. Still, federal grants and contracts was the second largest source of educational and general revenues for both public and private institutions in 1984 (fig. 2.3). In 1975, however, federal grants and contracts was the largest source of educational and general revenue for private institutions and the second largest source for public institutions.

The 28 universities also depended on the federal government for 25 percent of their educational and general revenues in 1984. Federal funds as a share of revenues includes such categories as land-grant appropriations, and grants and contracts for research and student aid. By sector, federal funds accounted for 22 percent of public universities' educational and general revenues, and 32 percent of private universities' education and general revenues in 1984, compared with 26 percent and 36 percent, respectively, in 1975 (fig. 2.5).

Figure 2.6

Educational and General Expenditures
(1984)



18 Public and 10 private institutions

Educational and general expenditures

Overall, the rank order of expenditure categories remained constant. That is, direct costs for instruction and departmental research continued to be the largest component of expenditures in 1975 and in 1984,[4] although its share declined slightly. Direct costs for sponsored research was the second largest defined category during the period, although its share also declined marginally. (Over 85 percent of sponsored research was in science and engineering in 1984.) Administration expenditures, operations and maintenance, and the "other" category all gained a small share of expenditures. (The "other" category includes public service, scholarships and fellowships, and mandatory transfers, but not federally funded research and development centers, which are excluded from this study.)

Total expenditures for research specifically in science and engineering (direct and indirect costs, including relevant administration and other costs) rose slightly from 26 to 27 percent of overall educational and general expenditures, from an average of $54 million in 1975 to $73 million in 1984.[5] The share of educational and general expenditures for research in science and engineering by private universities was consistently several percentage points higher than for public universities.

---

[4]In figure 2.6, indirect costs are included primarily in the categories for operations and maintenance, and administration.

[5]These data are for 16 public and 9 private institutions and are not shown in figure 2.6.

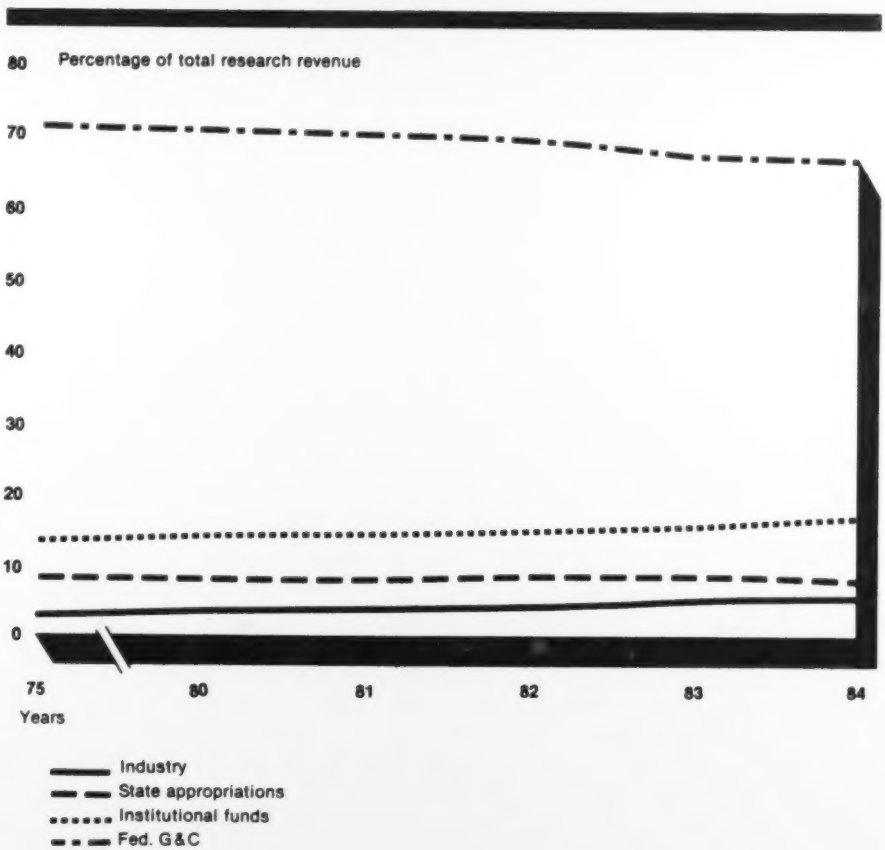
SECTION 3

REVENUES FOR RESEARCH AND DEVELOPMENT IN SCIENCE AND ENGINEERING

- Federal support for university research increased slower than most other sources, resulting in a decline in the federal share of research revenues from 71 percent in 1975 to 66 percent in 1984.
- Industry support more than doubled between 1975 and 1984, but still constituted only 6 percent of research revenues in 1984.
- University support for research from other institutional funds increased from 14 percent in 1975 to 17 percent in 1984.

Figure 3.1

Research Revenues by Source
(1975, 1980-84)



13 Public and 8 Private Institutions

RESEARCH REVENUES BY SOURCE

Overall, the federal government continued to dominate as a provider of research revenues for science and engineering in 1984, but its share declined between 1975 and 1984, while other sources of support either increased or remained about the same.

Federal support declined from 71 percent to 66 percent of total research funding during the period. Average federal research and development funding rose from $41 million to $50 million, but this increase was slower than that of most other sources of research and development revenue.

Industry research funding increased 125 percent, from $2 million to $4.5 million, on average. However, industry funding still only amounted to 6 percent of overall research revenue.

The "other institutional funds category,"[6] which includes endowment income, private gifts, foundation funds, and any unrestricted funding used for research, also increased from 14 percent of research funds in 1975 to 17 percent in 1984.

State appropriations remained at about 7 percent of research revenue. State and local research grants and contracts and federal appropriations, not depicted here, consistently accounted for about 3 percent and 1 percent of research and development revenues, respectively.

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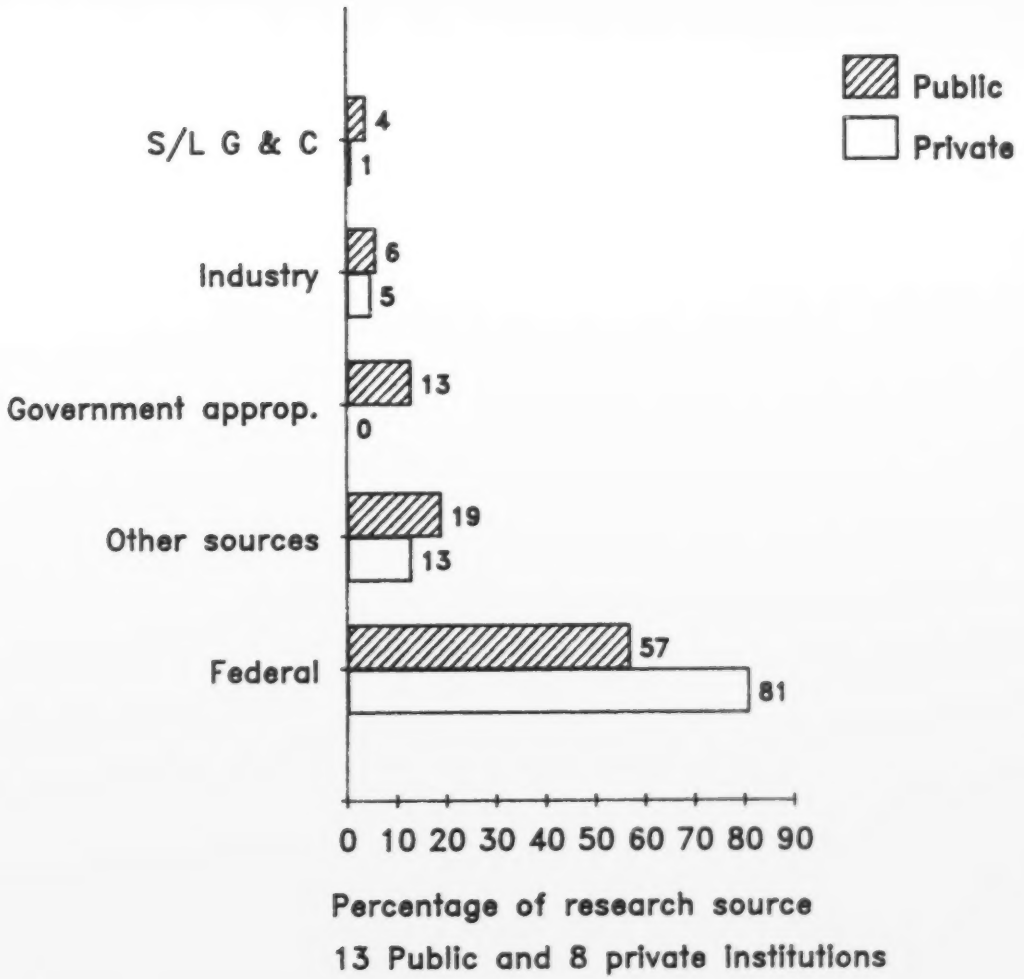
[6] The proportion of funds in this category is understated since not all the institutions were able to report complete data.

Figure 3.2

Research Revenues for Public and Private Universities[a]
(1984)



[a]Percentages do not add to 100 because of rounding.

Research revenues for public and private universities

Federal grants and contracts constituted a greater portion of the private universities' research revenues than they did the public universities'. For 1984, federal grants and contracts made up 81 percent of private universities' research funds, but only 57 percent of public universities'. The public universities were able to draw on their state appropriations and other funds, which may include foundation support and any other institutional funds. Industrial sources supported approximately the same share of research for both sectors. State and local grants and contracts supported over 3 percent of the research and development revenue of public universities and less than 1 percent of private institutions.

SECTION 4

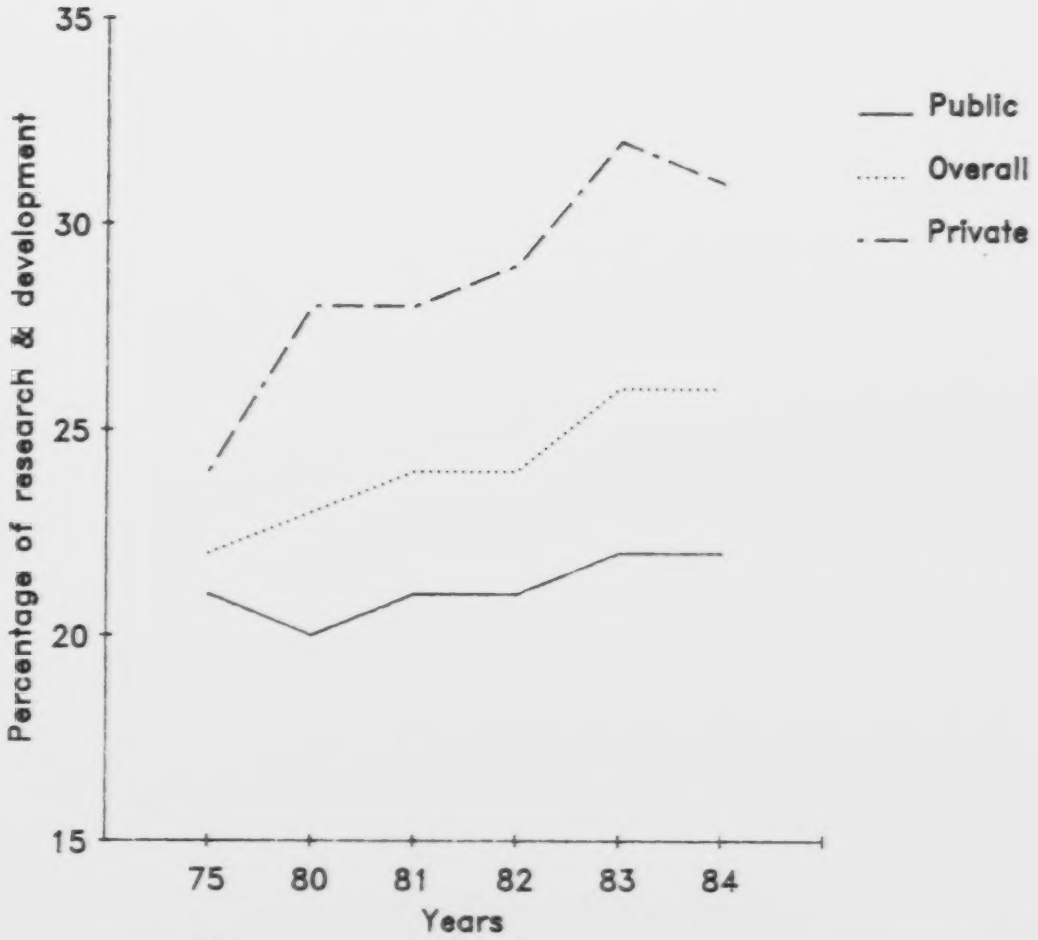
INDIRECT COSTS FOR RESEARCH AND DEVELOPMENT

- Indirect costs as a percentage of each federal research dollar rose from 22 percent in 1975 to 26 percent in 1984. Public institutions' overall level of indirect costs remained at a relatively constant 20 percent. Private institutions' indirect costs rose from 24 percent in 1975 to 31 percent in 1984.

- The administration categories consistently accounted for between 54 and 56 percent of all indirect costs for federally sponsored research between 1975 and 1984. Operations and maintenance accounted for the next largest share, increasing from 24 percent in 1975 to 28 percent in 1984.

Figure 4.1

Reimbursed Indirect Costs as a Portion of Total Federal Research and Development Funding, Public and Private Universities (1975, 1980-84)



12 Public and 6 private institutions

REIMBURSED INDIRECT COSTS

Indirect costs for research and development are those that support research but cannot be specifically attributed to individual projects. These costs include categories such as administration, facility operations and maintenance, and building and equipment depreciation. Accountants have developed techniques, on the basis of estimates, to distribute indirect costs among individual projects. Indirect cost rates for federal research are developed and negotiated in accordance with Office of Management and Budget (OMB) guidelines set forth in OMB Circular A-21.[7]

For the institutions in this sample, the federal government paid a higher proportion of their total university research and development funding for indirect costs than did their other sponsors of university research in 1984. Of every federal dollar paid for research, 26 cents was paid for indirect costs, 74 cents for direct costs (fig. 4.1). Of every industrial research and development dollar paid to these universities, 14 cents was for indirect costs; for state research and development support, 7 cents was for indirect costs. By sector, federally reimbursed indirect costs, as a proportion of total federal research funding, are higher and have increased more rapidly for private universities than for public universities.

From our interviews with experts on university finances, we learned that indirect cost reimbursements for state or industry research projects are determined differently than those negotiated with the federal government. Individual states and corporations may pay indirect costs which are based on arbitrarily set rates or rates negotiated on a project-by-project basis. Additionally, costs of research that may be claimed as indirect costs under federal funding are sometimes paid as direct costs under a specific industry or state government research award.

Public and private universities tend to use their indirect cost payments differently. Of the 17 public universities that provided information on how they use their payments, 13 retained from 50 to 100 percent of their reimbursements. The remaining four institutions either passed the reimbursed funds back to the

---

[7]OMB published a controversial revision to A-21 on June 9, 1986, in the Federal Register. The change will set a fixed overhead allowance for the administration of federal grants and contracts by department heads and faculty. The revision takes effect on July 1, 1987, but individual agencies may institute this change earlier.

state or retained the funds to offset state appropriations.[8,9] Many of the public institutions put at least some share of the reimbursements back into research (often through a formula based on the proportion of research an individual school had initially undertaken). Three institutions put all of their reimbursements back into research; two are required to do so by state law. Two of the public universities put all of their indirect cost reimbursements into their general university operating funds.

Of the six private universities for which we obtained information, four directed virtually all their indirect cost reimbursements to their general operating funds. Two of the institutions distributed a portion of the reimbursement to their individual schools for research.

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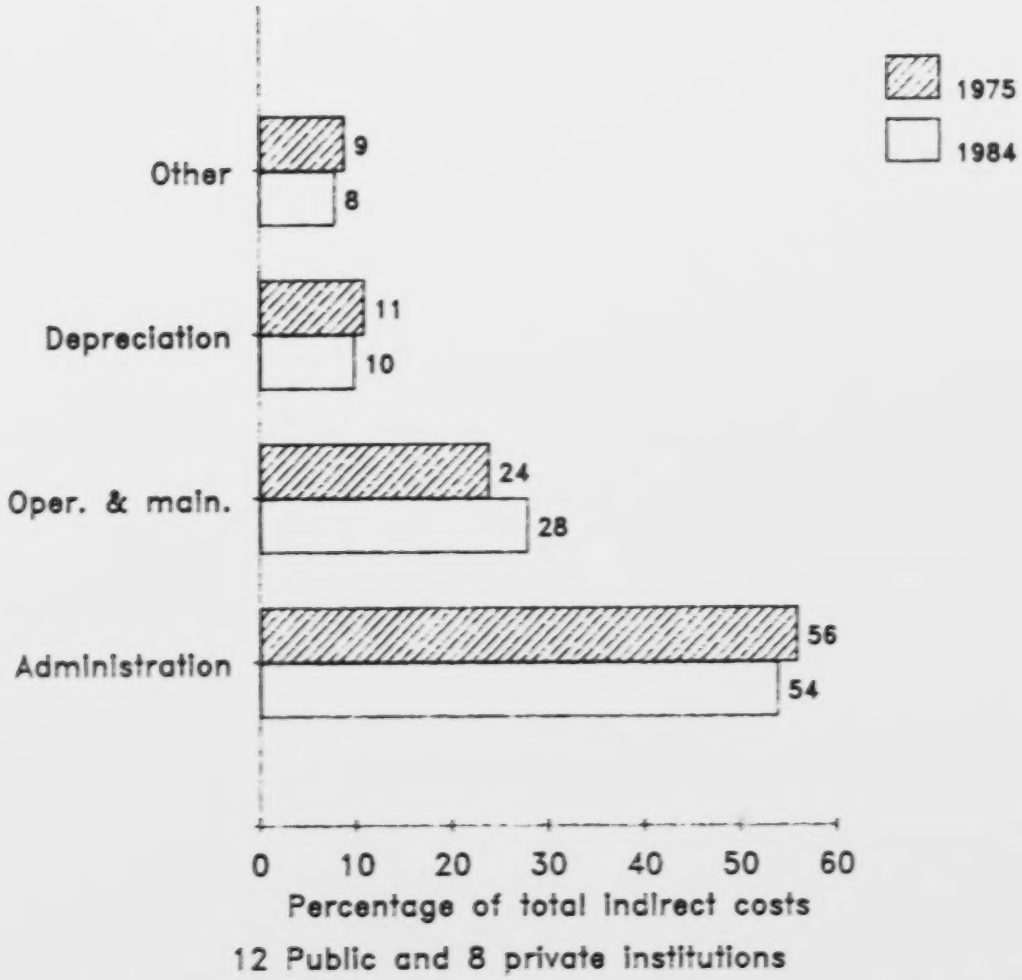
[8]Indirect cost payments are reimbursements for past research-related costs, and for most state universities, state appropriations are the source of the original expenditures. Budget off-sets and indirect costs passed back to the state are, in fact, reimbursements for those original expenses that generated the indirect costs.

[9]One of the states that took back these funds subsequently used about one-fourth of them to fund a special university research initiative.

Figure 4.2

Categories of Federally Reimbursed Indirect Costs
(1975, 1984)



12 Public and 8 private institutions

Categories of federally reimbursed indirect costs

Administration, which includes departmental administration, sponsored projects administration, and general university administration, is the largest category of federally reimbursed indirect costs. For the 20 institutions reporting these data, it consistently accounted for between 56 percent and 54 percent of indirect costs for federally sponsored research (fig. 4.2). For the public institutions, administration was 58 percent of indirect costs in 1975, 62 percent in 1984. For private institutions, administration was 53 percent of indirect costs in 1975 and 47 percent in 1984.

Operations and maintenance accounted for the next largest share of indirect costs, increasing from 24 percent in 1975 to 28 percent in 1984. Public and private institutions showed the same upward trend, with private institution's operations and maintenance reimbursed as a higher percentage of their indirect costs.

For the 17 public and 10 private institutions for which we received indirect cost data during the period 1981-84, the percentage of indirect costs attributed to the four categories for 1981 and 1984 is consistent with data for the same years from the 20 institutions having data for the entire period.

SECTION 5

UNIVERSITY PHYSICAL PLANT

- Federal and state revenues as proportions of total physical plant revenue decreased over the period while private and other institutional sources rose.
- The other institutional funds category remained the largest source of physical plant support, up from 43 percent in 1975 to 55 percent in 1984.
- Physical plant debt in proportion to current fund expenditures decreased from 32 percent in 1975 to 21 percent in 1984 for public universities and increased from 26 percent to 34 percent for private universities.
- The annual university capital investment in science and engineering was 9 to 12 times higher than the annual federal indirect cost reimbursement for building depreciation between 1980 and 1984.

RESEARCH FACILITIES

- The percentage of building space devoted to research stayed level from 1981-84, at about 14 percent. Private institutions used a slightly higher portion of their space for research than public universities.[10]

- The net increase in the book value of research facilities (essentially the acquisition costs for construction and renovation, since universities do not usually deduct depreciation) since 1981 accounted for a little over 10 percent of the change in the book value for all facilities for each year, 1981-83, and 35 percent of the change in overall book value for 1984.

- In current dollars, for example, overall physical plant book value increased an average of $21 million from 1980 to 1981, of which $2.3 million was for research facilities; the average overall change from 1983 to 1984 was $16 million, of which almost $5.5 million was due to research facilities.[11]

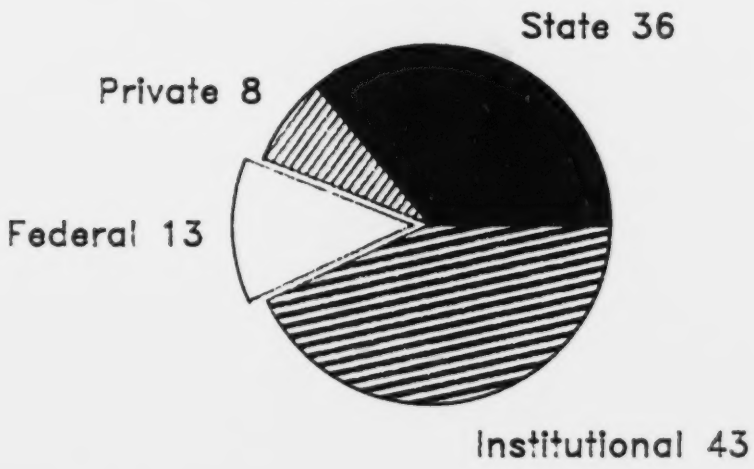
---

[10]These data are from 16 public and 5 private institutions.

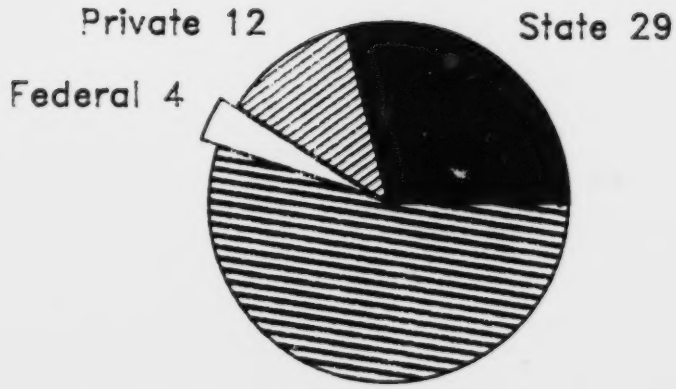
[11]These data are from 10 public and 4 private institutions. The increase in the last year was due in part to large increases for several institutions.

Figure 5.1

Sources of Physical Plant Revenue[a]
(1975, 1984)



1975



1984

10 Public and 8 private institutions

[a]Sources are reported as percentages.

SOURCES OF PHYSICAL PLANT REVENUE

Federal and state revenues as proportions of total physical plant revenue decreased from 1975 to 1984 while private gifts and "other institutional sources" rose (fig. 5.1).[12] "Other institutional funds" includes money from the universities' general fund (that is, unrestricted money originally given to the institution by other sources). The specific sources of these funds could not be distinguished because of the pooling of general unrestricted operating funds.

The other institutional funds category remained the largest source for physical plant support. This category consistently accounted for about 70 percent of private universities' overall physical plant revenue, and a gradual increase from 35 percent to 45 percent for public universities'. (Not shown in fig. 5.1.)

As expected, public and private universities differed significantly in the level of state support for physical plant. Public institutions received about 45 percent of their plant revenue from state sources for both 1975 and 1984, while private universities received nothing from these sources. (Not shown in fig. 5.1.)

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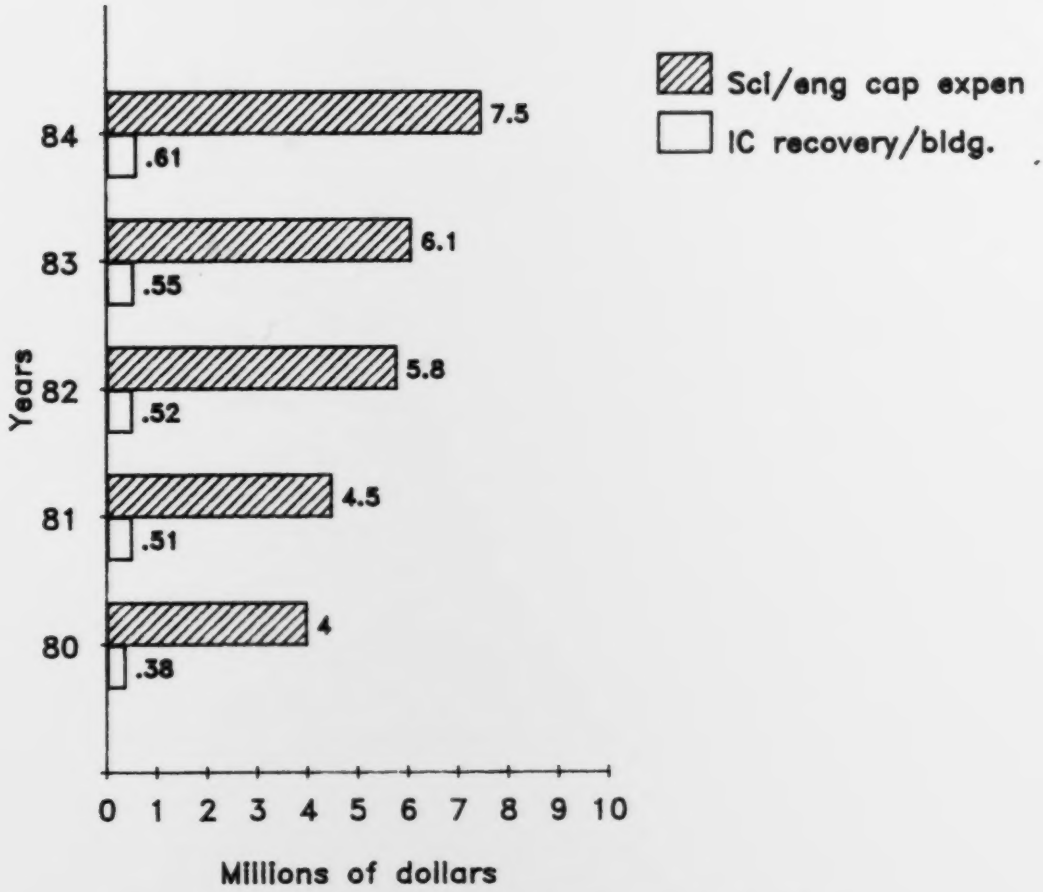
[12]These data represent the best estimates of sources of revenues combined for the several relevant subgroups of plant funds, which include unexpended plant funds, funds already invested in property, funds for retirement of indebtedness, and funds for renewal and replacement. These revenues do not include the use of debt to fund physical plant construction.

Figure 5.2

Indirect Costs for Building Depreciation, Compared with Capital Expenditures for Science and Engineering Facilities[a] (1980-84)



Averages for 11 Public and 7 private institutions

[a]All data are in current dollars.

INDIRECT COSTS FOR BUILDING DEPRECIATION COMPARED WITH CAPITAL EXPENDITURES

We were asked to determine whether universities spent as much on construction for research facilities and the purchase of research equipment as they received from the federal government in the form of indirect cost reimbursements for depreciation or use charges for research facilities and equipment.[13]

Between 1980 and 1984, the annual university investment for construction in science and engineering was 9 to 12 times higher than the annual federal indirect cost reimbursement for building depreciation, in current dollars.[14] Universities spent an average of $4 million on capital expenditures in 1980, steadily increasing to over $7 million in 1984. The growth in spending was due entirely to the private institutions, which began the period averaging $3 million and ended by spending an average of $12 million. The public institutions spent, on average, between $4 million and $5 million annually over this period.

In current dollars, annual federal reimbursements for indirect costs for the use of buildings averaged about $400,000 in 1980, and $600,000 in 1984. Private institutions were responsible for the increasing reimbursements--averaging $600,000 in 1980, and over $1 million in 1984. Reimbursements to the public institutions were consistently about $300,000 annually.

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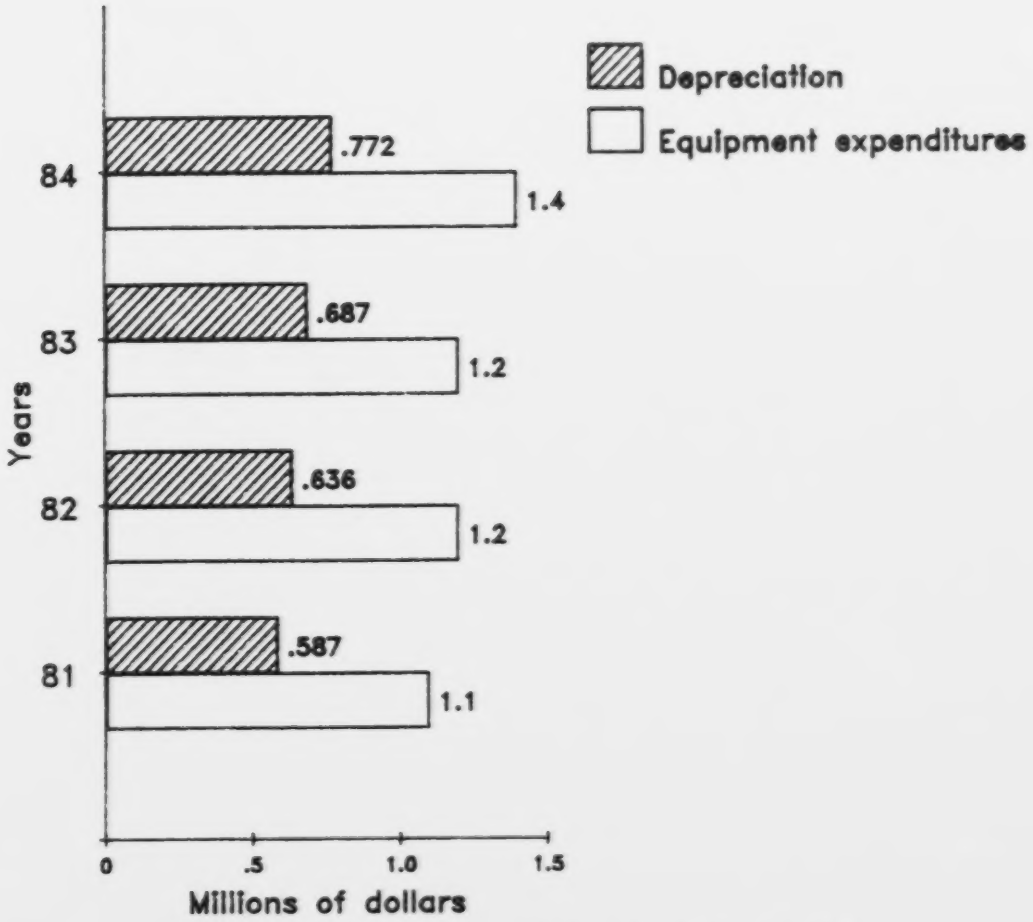
[13]Since indirect cost payments are reimbursements for past research-related costs, universities are not required to reinvest indirect cost payments in their research facilities.

[14]The capital expenditure data collected annually by the National Science Foundation (NSF) is for "science and engineering activities," which includes instruction as well as research and an unknown proportion of expenditures for equipment purchased from capital funds. It is often very difficult for a university to determine the portion of a mixed use facility that will be used exclusively for research over the life of the structure. Although we specifically requested the universities in this sample to provide expenditure data only for the portion of these facilities to be used for research, it is very likely that expenditures for science and engineering instructional facilities are included as well. Indeed, several institutions informed us that they provided the same figures to us as they did to NSF. Therefore, the relationship between indirect cost reimbursement for building use and capital expenditures is an approximation, given the limitations of these data.

Figure 5.3

Indirect Costs for Equipment Depreciation Compared with Non-Federal Expenditures for Equipment [a]
(1981-1984)



[a]All data are in current dollars.

INDIRECT COSTS FOR EQUIPMENT DEPRECIATION COMPARED WITH NON-FEDERAL RESEARCH EQUIPMENT EXPENDITURES

We found that annual university expenditures for research equipment from non-federal sources was about twice as much as the annual federal reimbursement for equipment depreciation in current dollars from 1981 to 1984.[15]

Non-federal sources provided, on average, over $1 million for research equipment in 1981 and about $1.5 million in 1984. Federal reimbursements for indirect costs for research equipment depreciation averaged $600,000 in 1981 and almost $800,000 in 1984.

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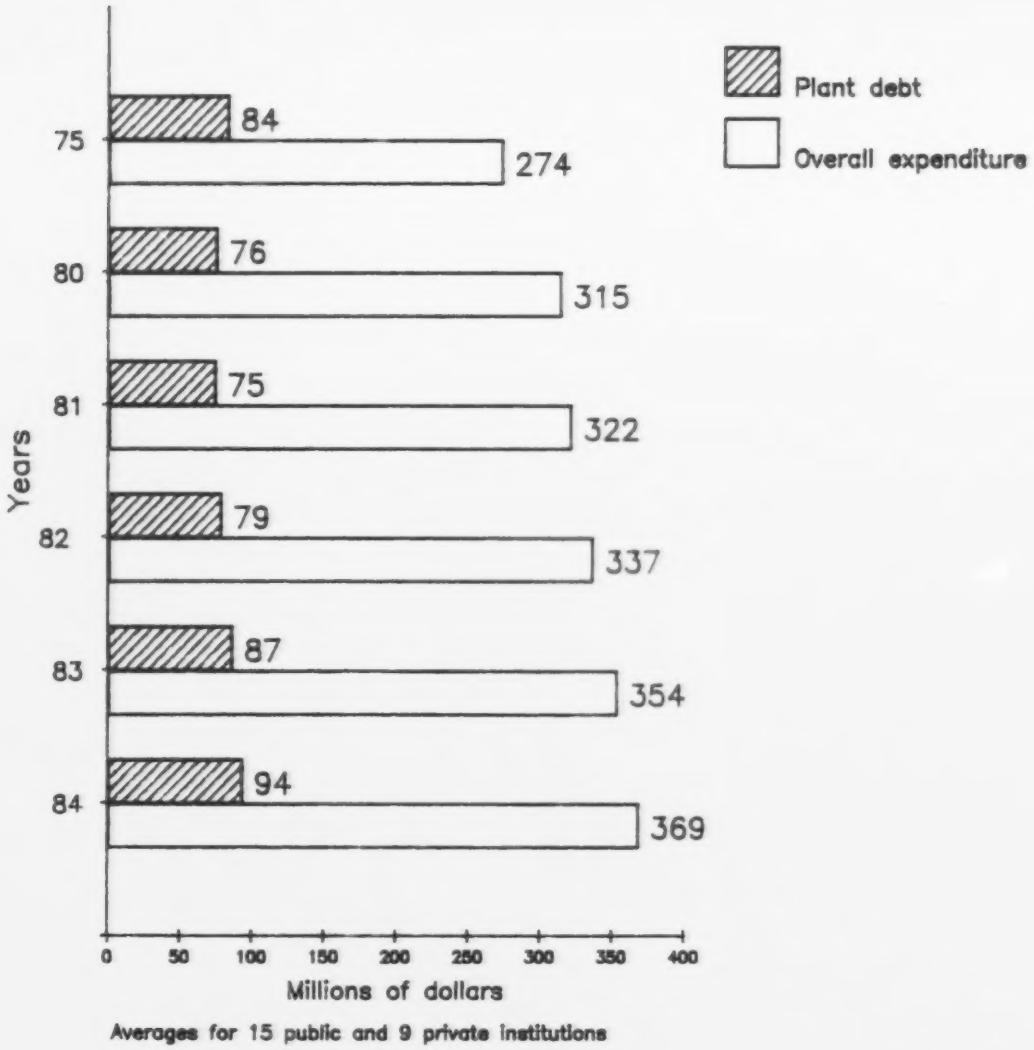
[15]Non-federal sources includes state, industrial, foundation, and other university funds.

Figure 5.4

Physical Plant Debt, Overall Expenditures
(1975, 1980-84)



Plant debt

Experts on university finances who we interviewed expressed some concern that universities may be increasing their physical plant debt due, in part, to borrowing for research facilities.

Debt due to borrowing for physical plant fell in proportion to total current fund expenditures over the 10-year period for all institutions in our sample. In constant 1984 dollars, current fund expenditures grew much faster than plant debt over the period. Between 1975 and 1984, debt grew 13 percent while current fund expenditures rose 35 percent. Debt was 30 percent of expenditures in 1975; however, by 1984 it had dropped to 26 percent. Average plant debt declined from $84 million in 1975 to $75 million in 1981, but then increased to $94 million by 1984.

There are, however, significant differences by type of institution. Private universities' debt for physical plant increased 88 percent, while public universities' debt decreased 16 percent over the period. In addition, current fund expenditures rose only 29 percent for public universities but 47 percent for private universities.[16]

Private plant debt in proportion to overall private expenditures rose from 26 percent in 1975, to 30 percent in 1982, to 34 percent in 1984. Public institutions' plant debt, on the other hand, declined from 32 percent of expenditures in 1975 to 21 percent in 1984.[17]

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[16]According to one of the financial experts with whom we consulted, some of the physical plant debt for public universities may be carried by state governments rather than by the individual institutions.

[17]Similarly, interest payments on physical plant debt in proportion to private university current fund expenditures rose from 1.3 percent in 1981 to 1.6 percent in 1984. The corresponding proportion for public institutions was a steady 1.1 percent for each year, 1981 through 1984.

SECTION 6

RESEARCH CAPABILITY UNDER ALTERNATIVE LEVELS OF FEDERAL FUNDING

- Universities consider inadequate research equipment and facilities to be the major impediments to research.

- University officials believe that if federal funds for research declined, personnel reallocation and retrenchment would occur, the infrastructure would be even more inadequate, and new endeavors could be cut. However, some institutions have identified specific fields, predominantly those that are interdisciplinary and involve applied research, which they would like to see emphasized on their campuses as part of their strategy to attract more non-federal research funding.

UNIVERSITY INTERVIEWS

Because the federal government provides most of universities' research funding, any change in the level of federal funding has a potentially significant impact on the university's ability to do research.[18] To assist us in understanding how future federal research funding levels would affect universities, we interviewed senior academic executives on the factors that presently impede the research efforts of the universities in our sample and on the factors that may constrain the research programs under various future funding levels.

Factors inhibiting present research efforts

The inadequacy of both present research equipment and research facilities was cited as the leading constraint to the present research efforts of these universities (table 6.1). Inadequate research equipment was reported as a hindrance to present research by 23 universities and inadequate facilities by 20 of the universities. Nine universities--all public--cited difficulties in recruiting and supporting graduate students in science and engineering.

Table 6.1

Present Constraining Factors

Factor	Public (n=17)	Private (n=9)	Total (n=26)
Research equipment	17	6	23
Research facilities	13	7	20
Graduate students	9	0	9

Several public institutions stated that their problem with graduate students is particularly acute in attracting high-quality U.S. citizens in engineering. This latter point matches NSF data, which show that over a third of full-time engineering graduate students in the fall of 1983 in the United States held foreign citizenship.

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[18]Many other factors may affect university finances and consequently research spending. Examples include: student enrollments and interests, federal and state student aid programs, economic conditions, government regulations, and state appropriations. An analysis of the potential effects of such factors is beyond the scope of this report.

Factors inhibiting future research efforts under a constant level of federal research funding

University officials stated that if the level of federal research funding were to remain roughly what it is now, the factors inhibiting their present research efforts, as described in table 6.1, would remain and would probably worsen if there were not additional remedies.

Factors inhibiting future research efforts with a decline in federal research funding

A decline in federal research funding would generally exacerbate present constraining factors said university officials, who reported three kinds of likely effects:

--Personnel reallocation/retrenchment. The aspect of retrenchment most mentioned was the potential necessity of cutting back on the number of personnel employed, particularly technicians, graduate students, and young faculty, since universities have commitments to tenured faculty. Officials from several institutions discussed the difficulty of these choices, since they placed very great importance on the linkage between graduate education and research, and the consequent need to support graduate students through fellowships and assistantships. On the other hand, one official predicted that his institution would replace graduate students with technicians to assure that research continues to get done. It was not clear how personnel cuts would be spread across programs. Several universities reported that they have begun or would begin evaluations of the relative strengths of their academic and research programs to decide which, if any, they should drop altogether.

--Infrastructure. Present constraints caused by inadequate research equipment and facilities would be exacerbated.

--Research. Seed money or "venture capital" for new endeavors would be cut.

Additionally, officials at two private institutions noted that their indirect cost rates would probably increase if their federal research funding dropped, since the indirect costs are relatively fixed and would have to be spread over a smaller amount of federal research awards.

University officials described how, in response to potential declines in federal research funding, their institutions are building on their existing or future program strengths to attract new research money. Some universities have identified specific fields, predominantly those that are interdisciplinary and

involve applied research, which they would like to see emphasized on their campuses. Some universities have set up new centers (sometimes as part of new research parks) or provided matching funds as inducements for faculty to target these areas. These shifts into areas such as molecular biology, electronics, telecommunications, and materials are part of the universities' strategy to solicit research support more aggressively from state governments and private industry.

Finally, a small number of university officials were confident that a national decline in federal research funding would not adversely affect their institution. They believed that they were sufficiently competitive to win an adequate amount of research funding to support their university's current or future research effort.

SECTION 7

OBJECTIVES, SCOPE, AND METHODOLOGY

OBJECTIVES

The Chairman of the House Committee on Science and Technology asked us to provide a comprehensive analysis of how federal funding for research fits into the total financial situation of research universities, that is, the 100 universities that perform the bulk of federally funded university research. In fiscal year 1983, these institutions performed 85 percent of federally supported research and development, and enrolled 52 percent of the nation's graduate students in science and engineering. Committee staff and we agreed to focus our study on a sample of these major research universities.

Specifically, the Chairman asked us to (1) analyze their overall revenues and expenditures, (2) examine how they support research, particularly whether federal research funds are used for non-research purposes, and the extent to which other university funds are used to support federally sponsored research, and (3) discuss universities' capacity to accommodate a continued or changing level of federal research funding. We subsequently agreed with committee staff that this report would not audit how specific universities spent their federal funds. However, we would endeavor to show all sources of revenue that support research.

SCOPE AND METHODOLOGY

To choose universities for study, we selected a random sample of 28 institutions from the 100 universities receiving the majority of federal research funds in fiscal year 1983, the latest year for which data were then available. Our sample of 28 universities approximates the research profile of the top 100 institutions in terms of federal research revenues and graduate students. These 28 received 30 percent of federal research and development funds received by the 100 major research universities (26 percent of all federal university-based research and development in fiscal year 1983) and enrolled 31 percent of the graduate students in science and engineering in the top 100 (16 percent of the national total). Our sample also has roughly the same proportion of public to private institutions as the top 100 research institutions. Of these 100, 35 were private and 65 were public in fiscal year 1983. In our sample, 10 were private and 18 were public.

We believe this sample generally reflects the situation of the major research universities. However, the small number in our sample, the enormous diversity in size, objectives, organization, location, personnel, and funding of these institutions means that our sample is not necessarily statistically reliable. Additionally, some of the data we wished to collect were not available for all years at many of the institutions in our sample. Rather than not reporting any data

on certain aspects of several important topics (e.g., indirect costs), we include these items and note the number of universities and the years for which they submitted usable data. Care should be taken in interpreting these particular data because they are based on a small number of universities.

Data collection

We collected data on revenues, expenditures, and university support for research for fiscal year 1975 and fiscal years 1980-84. We selected these years to give us data over a 10-year period while minimizing the response burden. Data for earlier years were not consistently available.

We collected data on overall revenues--tuition and fees, government appropriations, gifts, grants, and contracts--from private and public sources, and expenditures--instruction, research, scholarships and fellowships, operations and maintenance. To learn about university support for research, we collected information on research revenues for both indirect and direct costs--appropriations, government and industry grants and contracts, and research expenditures by source. Additionally, we collected information on the amount of money invested in physical plant, the sources of revenue for physical plant, and what portion of these facilities were devoted to research. Finally, we asked for information on the portion of faculty and student research that occurs in off-campus research facilities, such as federal laboratories. These data are not sufficient to warrant reporting in this report.

To ease the response burden on the universities, we obtained as much data as possible through 1983 from existing annual surveys by the Department of Education--the Financial Statistics of Institutions of Higher Education, which is part of the Higher Education General Information Survey, and NSF's surveys of expenditures for research and development in science and engineering. We inserted the appropriate prior year data in our schedules and requested each institution to complete our schedules by providing additional data, and verifying or correcting previous data. We checked for consistency of these data with other published data from each university, such as annual financial reports; questioned the institutions on any apparent differences; and made any warranted changes in consultation with each institution.

We relied primarily on the perceptions of senior academic executives at our sampled institutions to provide information and observations on the future capacity of these institutions to perform various levels of federally funded research. We developed this information by conducting a literature review on university financial health and developing a set of questions that we used during subsequent telephone interviews with a senior

research administrator from each university in our sample (usually the vice president or vice provost for research).

We were assisted greatly in our development of both the financial and interview questions by site visits with chief executives, and research and financial administrators at the Universities of Maryland, Pennsylvania, Illinois at Chicago, California at Berkeley, and Southern California; the Massachusetts Institute of Technology, Stanford University, Harvard University, and the California Institute of Technology. We also benefitted from discussions with officials of the Council on Governmental Relations (an organization of research universities), the Association of American Universities, and the National Association of State Universities and Land-Grant Colleges. Additionally, we had numerous discussions with officials of NSF, the Department of Education's Center for Statistics, and the Department of Health and Human Services staff under the Deputy Assistant Secretary for Procurement, Assistance, and Logistics. We also were advised by experts on university finances who are employed by major public accounting firms. Finally, we used the services of two independent consultants to assist us in developing our data collection instruments and analyzing our results. Members of these groups participated in an advisory committee session early in the scoping of this project and reviewed early drafts of this report.

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